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Statistical Analysis of the Annual Average F.O.B. Prices of Pacific Coast Canned Bartlett Pears, 1926-27 to 1949-50

by
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Sidney Hoos[1]

The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned Bartlett pears by canners on the Pacific Coast from 1926-27 through 1949-50. The years 1940-41 through 1945-46 were excluded from the analysis because of the abnormal conditions which prevailed during the war years, such as federal price control; and 1946-47 was excluded because a large proportion of canner shipments went into the refilling of the supply pipe line rather than into consumers' hands.

In the analysis the average relationships which prevailed between the f.o.b. prices of Pacific Coast canned Bartlett pears and three factors were measured. These three factors are (1) total domestic shipments of Pacific Coast canned Bartlett pears; (2) index of nonagricultural income payments in the United States; and (3) adjusted index of prices of competing canned fruits.

Expressed in numerical terms these average relations may be summarized as follows:

(a) A change of 10 per cent in domestic shipments of Pacific Coast canned Bartlett pears, with nonagricultural income and with competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of about 2½ per cent in the f.o.b. price per case of canned Bartlett pears.

(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of Pacific Coast canned Bartlett pears and with prices of competing canned

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The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned Bartlett pears by canners on the Pacific Coast from 1926-27 through 1949-50. The years 1940-41 through 1945-46 were excluded from the analysis because of the abnormal conditions which prevailed during the war years, such as federal price control, and 1946-47 was excluded because a large proportion of canner shipments went into the refilling of the supply pipe line rather than into consumers' hands.

In the analysis the average relationships which prevailed between the f.o.b. prices of Pacific Coast canned Bartlett pears and three factors were measured. These three factors are (1) total domestic shipments of Pacific Coast canned Bartlett pears; (2) index of nonagricultural income payments in the United States; and (3) adjusted index of prices of competing canned fruits.

Expressed in numerical terms these average relations may be summarized as follows:

(a) A change of 10 per cent in domestic shipments of Pacific Coast canned Bartlett pears, with nonagricultural income and with competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of about 5½ per cent in the f.o.b. price per case of canned Bartlett pears.

(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of Pacific Coast canned Bartlett pears and with prices of competing canned

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fruits held constant, was on the average accompanied by a change in the same direction of about 12 per cent in the f.o.b. price per case of canned Bartlett pears.

(c) A change of 10 per cent in the adjusted index of prices of competing canned fruits, with domestic shipments of Pacific Coast canned Bartlett pears and with nonagricultural income held constant, was on the average accompanied by a change in the same direction of about 9 per cent in the f.o.b. price per case of canned Bartlett pears.

Differences between the actual prices and those explained by the statistical analysis are given in table 4, column 3.

The f.o.b. prices of canned Bartlett pears used in the report are industry average prices; they are based on records of canners, and reflect actual operations of the canneries packing Bartlett pears in California and in the Northwest.

The domestic movement of canned Bartlett pears from canners in the three Pacific Coast states has been derived from statistics issued by the Canners League of California and the Northwest Canners Association; the total movement from canneries has been adjusted for exports to derive the movement to the domestic market.

The index of United States nonagricultural income is based on reports issued by the United States Department of Commerce. At the time the analysis was made, nonagricultural income figures for the 1949-50 season were available only through April 1950. Also, it must be noted that during January-April 1950 some 2.482 billion dollars were distributed to veterans in connection with insurance dividend adjustments. Such disbursements to veterans began in the middle of January 1950 and continued through the rest of the 1949-50 marketing season. The reported nonagricultural income figures, therefore, have been adjusted for the veteran insurance dividend disbursements noted above. In the nonagricultural income figures used for the 1949-50 in the analysis, it has been necessary to estimate the value for May 1950; it has been estimated at the average value reflecting the 3-month

Fruits held constant, there was the average occupied farm income in the same district of about 32 percent higher than the farm per case of canned Bartlett pears.

(e) A change of 10 percent in the adjusted index of prices of competing canned fruits, with household expenditure for Fruits Cans, caused Bartlett pears and with nonagricultural income held constant, was on the average accompanied by a change in the same direction of about 9 percent in the farm price per case of canned Bartlett pears.

Differences between the actual prices and those calculated by the statistical analysis are given in Table 4, column 5.

The 5-year prices of canned Bartlett pears used in this report are industry average prices; they are based on records of canners and reflect actual operations of the canneries producing Bartlett pears in California and in the Northwest.

The domestic consumption of canned Bartlett pears from canners in the three Pacific Coast states has been derived from statistics issued by the Canners Leagues of California and the Northwest. Canners Association, the total movement from canneries has been adjusted for exports to derive the movement to the domestic market.

The index of United States nonagricultural income is based on reports issued by the United States Department of Commerce. At the time the analysis was made, nonagricultural income figures for the 1949-50 season were available only through April 1950. Also, it must be noted that during January-April 1950 some 2,400 billion dollars were distributed to veterans in connection with insurance dividend adjustments. Such distributions to veterans began in the middle of January 1950 and continued through the rest of the 1949-50 marketing season. The reported nonagricultural income figures, therefore, have been adjusted for the veteran insurance dividend distributions noted above. In the nonagricultural income figure used for the 1949-50 in the analysis, it has been necessary to estimate the value for May 1950; it has been estimated as the average value reflecting the 3-month

period February 1950 through April 1950.

The level of competing canned fruit prices has been measured by an index constructed in the same manner as in the previous reports on canned Bartlett pears; the construction of the index is explained in some detail in table 3 appended to this report. The f.o.b. prices of canned apricots and canned clingstone peaches are based on reports from California canners, and reflect actual operations of the packers. The prices for canned apricots were compiled by the Canners League of California, and the prices of canned clingstone peaches were compiled by the Cling Peach Advisory Board. The prices of canned Hawaiian pineapple are based on published quotations supplemented by available trade information.

Specific sources for the several series of data used in the analysis, and more detailed specifications, are noted in the explanatory footnotes to tables 1, 2 and 3 appended to this report.

In connection with the interpretation and use of the results of the statistical analysis summarized above, the following major highlights of the 1949-50 season are pertinent. The season opened (June 1, 1949) with a carry-over in canners' hands of 761,000 cases (24/2½ basis), and 5.459 million cases of Bartlett pears were packed on the Pacific Coast; thus, a total supply of 6.220 million cases were available. This compares with 4.557 million cases as the total supply for the previous year 1948-49 which began with a carry-over of 726,000 cases and had a pack of 3.831 million cases.

With a favorable level of national income and prices lower than in any of the previous postwar years, very large shipments of Bartlett pears moved from the Pacific Coast canneries. The movement in 1949-50, in fact, exceeded that of the earlier postwar years as well as the prewar years. As a result, the 1950-51 marketing year opened with stocks (sold and unsold) on June 1, 1950 of 448,000 cases in Pacific Coast canners' hands, or some 313,000 cases under the opening stocks of a year ago.

TABLE 1

Statistical Analysis of Annual Average F.O.B.
Prices of Pacific Coast Canned Bartlett Pears
(1926-27 Through 1949-50, Excluding 1940-41 Through 1946-47)

Year, June through May	Pacific Coast f.o.b. price canned Bartlett pears	Domestic shipments of canned Bartlett pears	Index of United States nonagricultural income	Adjusted index of prices of competing canned fruits
	1	2	3	4
	dollars per case	1,000 cases a/	1935-1939=100	1935-1939=100
1926-27	4.31	1,957	115.3	119.0
1927-28	4.60	1,637	116.2	105.9
1928-29	4.13	2,170	120.7	103.3
1929-30	4.82	2,383	120.2	121.4
1930-31	3.53	2,617	104.4	107.7
1931-32	2.82	1,990	85.5	108.3
1932-33	2.48	2,200	68.1	118.2
1933-34	2.64	2,767	75.5	123.0
1934-35	3.05	2,984	82.1	128.1
1935-36	2.92	2,670	91.0	109.1
1936-37	2.92	3,997	106.5	95.2
1937-38	3.07	2,681	103.3	107.1
1938-39	2.77	3,114	101.0	90.6
1939-40	3.27	2,768	109.6	88.7
1947-48	7.07	4,866	290.1	60.3
1948-49	7.37	3,660	308.0	59.2
1949-50 b/	5.15	5,613	310.3	50.7

a/ No. 2½ can basis.
b/ Preliminary, subject to revision.

Sources of data:

Col. 1: Compiled from canner reports by Canners League of California and Northwest Canners Association. Prices are weighted average f.o.b. prices received by canners for all grades and sizes of cans, on an unadvertised basis.

Col. 2: Column 7, table 2.

Col. 3: Simple average of the pack-year monthly indexes of national income, excluding agricultural income, 1935-1939 average equals 100. Monthly income data compiled from U.S. Dept. of Commerce, Survey of Current Business. Index for May 1950 estimated at a level of 314.7, the average of February-April 1950.

Col. 4: For sources and method of construction see table 3.

TABLE 1

Statistical Analysis of Annual Average F.O.B. Prices of Pacific Coast Canned Bartlett Pears (1924-27 through 1948-50, Excluding 1943-44 through 1946-47)

Year June through May	Pacific Coast f.o.b. price canned Bartlett pears	Domestic shipments of canned Bartlett pears	Index of United States nonagricultural income	Adjusted index of prices of competing canned fruits
	1	2	3	4
	dollars per case	1,000 cases	1935-1939=100	1935-1939=100
1924-27	4.31	1,957	115.5	119.0
1925-26	4.60	1,837	116.5	106.5
1926-27	4.15	2,170	120.1	105.3
1927-28	4.45	2,385	120.2	121.7
1928-29	3.85	2,117	124.4	107.1
1929-30	2.84	1,980	86.5	106.5
1930-31	2.48	2,200	68.1	113.2
1931-32	2.64	2,107	76.5	122.0
1932-33	3.03	2,094	82.1	129.1
1933-34	2.92	2,070	91.0	103.1
1934-35	2.92	2,207	106.5	93.5
1935-36	3.07	2,881	108.5	107.1
1936-37	2.41	3,114	101.0	90.6
1937-38	3.21	2,168	109.6	88.7
1947-48	7.07	4,866	290.1	60.3
1948-49	7.87	3,660	308.0	59.8
1949-50 b/	5.15	5,615	310.5	50.7

a/ No. 2½ can basis.
b/ Preliminary, subject to revision.

Sources of data:

Col. 1: Compiled from canner reports by Canners Leagues of California and Northwest Canners Association. Prices are weighted average f.o.b. prices received by canners for All grades and sizes of cans, on an unadvertised basis.

Col. 2: Column 7, table 2.

Col. 3: Simple average of the peak-year monthly indexes of national income, excluding agricultural income, 1935-1939 average equals 100. Monthly income data compiled from U.S. Dept. of Commerce, Survey of Current Business. Index for May 1950 estimated at a level of 314.7, the average of February-April 1950.

Col. 4: For sources and method of construction see table 5.

TABLE 2

Pack, Carry-Over, Shipments, and Exports of Pacific Coast Canned Bartlett Pears, 1926-27 to 1949-50

Year, June through May	Pack	Carry-over from previous year	Available for shipment	Carry-over into following year	Total shipments	Exports	Domestic shipments
	1	2	3	4	5	6	7
	1,000 cases[a]						
1926-27	3,260	507	3,767	401	3,366	1,409	1,957
1927-28	2,639	401	3,040	167	2,873	1,236	1,637
1928-29	4,116	167	4,283	292	3,991	1,821	2,170
1929-30	4,206	292	4,498	952	3,546	1,163	2,383
1930-31	4,153	952	5,105	893	4,212	1,595	2,617
1931-32	3,635	893	4,528	870	3,658	1,668	1,990
1932-33	3,117	870	3,987	429	3,558	1,358	2,200
1933-34	4,377	429	4,806	273	4,533	1,766	2,767
1934-35	5,505	273	5,778	1,291	4,487	1,503	2,984
1935-36	4,230	1,291	5,521	957	4,564	1,894	2,670
1936-37	5,355	957	6,312	850	5,462	1,465	3,997
1937-38	4,321	850	5,171	1,150	4,021	1,340	2,681
1938-39	4,090	1,150	5,240	400	4,840	1,726	3,114
1939-40	4,057	400	4,457	280	4,177	1,409	2,768
1947-48	5,622	200	5,822	726	5,096	230	4,866
1948-49	3,831	726	4,557	761	3,796	136	3,660
1949-50	5,459	761	6,220	448	5,772	159	5,613

a/ No. 2½ can basis.

Sources of data:

Col. 1: Compiled from reports of Canners League of California and Northwest Canners Association.

Cols. 2 and 4: Compiled from reports of Canners League of California and Northwest Canners Association. Carry-overs for June 1, 1937, 1938, 1939, and 1940 were estimated from incomplete data. California and Pacific Northwest carry-overs for June 1, 1926, 1927, 1928, 1929, and 1930 were converted from actual cases. Also Pacific Northwest carry-over for June 1, 1932 was converted from actual cases.

Cols. 3 and 5: Calculated.

Col. 6: Compiled from United States Department of Commerce, Monthly Summary of Foreign Commerce of the United States. Exports converted at 45 pounds per No. 2½ equivalent case. May 1950 exports estimated.

Col. 7: Col. 5 minus col. 6.

TABLE 3

Construction of Index of Prices of Canned Fruits Competing With Canned Bartlett Pears

Year, June through May	Prices			Relatives of prices			Unadjusted index of prices of competing canned fruits	Index of United States nonagricultural income	Adjusted index of prices of competing canned fruits
	Canned clingstone peaches	Canned apricots	Canned pineapples	Canned clingstone peaches	Canned apricots	Canned Hawaiian pineapple			
	1	2	3	4	5	6	7	8	9
	dollars per case			1935-1939 = 100					
1926-27	3.66	3.85	4.70	142.2	137.3	130.6	137.2	115.3	119.0
1927-28	3.17	3.97	4.20	123.2	141.6	116.7	123.1	116.2	105.9
1928-29	3.22	3.67	4.40	125.1	130.9	122.2	124.7	120.7	103.3
1929-30	4.08	3.97	4.70	158.5	141.6	130.6	145.9	120.2	121.4
1930-31	2.88	3.32	4.00	111.9	118.4	111.1	112.4	104.4	107.7
1931-32	2.55	2.64	3.00	99.1	94.2	83.3	92.6	85.5	108.3
1932-33	1.97	2.23	3.10	76.5	79.5	86.1	80.5	68.1	118.2
1933-34	2.31	2.37	3.60	89.7	84.5	100.0	92.9	75.5	123.0
1934-35	2.69	3.47	3.60	104.5	123.8	100.0	105.2	82.1	128.1
1935-36	2.51	2.93	3.60	97.5	104.5	100.0	99.3	91.0	109.1
1936-37	2.66	2.75	3.60	103.3	98.1	100.0	101.4	106.5	95.2
1937-38	2.96	3.02	3.80	115.0	107.7	105.6	110.6	103.3	107.1
1938-39	2.30	2.55	3.40	89.4	90.9	94.4	91.5	101.0	90.6
1939-40	2.44	2.77	3.60	94.8	98.8	100.0	97.2	109.6	88.7
1947-48	4.70	5.20	5.80	182.6	185.4	161.1	174.9	290.1	60.3
1948-49	4.86	4.55	6.50	188.8	162.3	180.6	182.4	308.0	59.2
1949-50 a/	3.94	4.11	6.00	153.1	146.6	166.7	157.4	310.3	50.7

a/ Preliminary, subject to revision.

Sources of data:

Cols. 1 and 2: Compiled from reports by canners. Prices are weighted average f.o.b. prices of all grades and sizes of cans. Canned clingstone peach prices are for California; and canned Bartlett pear prices are for the Pacific Coast, except 1947-48 is for California.

(Continued on next page.)

Table 3 continued.

Col. 3: Prices are for No. 2-1/2 sliced fancy pineapple, Hawaiian, f.o.b. San Francisco from published quotations supplemented by trade information.

Cols. 4, 5 and 6: Prices given in cols. 1, 2, and 3, respectively, in per cent of their 1935-1939 averages--canned clingstone peaches, $2.574; canned apricots, $2.804; canned pineapples, $3.60.

Col. 7: Weighted combination of relatives in cols. 4, 5, and 6 using the following weights--canned clingstone peaches, 8; canned apricots, 2; canned pineapples, 6.

Col. 8: From table 1, col. 3.

Col. 9: Col. 7 divided by col. 8.

TABLE 4

Actual and Estimated F.O.B. Prices of Pacific Coast Canned Bartlett Pears, 1926-27 to 1949-50

Year, June through May	Actual price	Estimated price	Difference column 1 minus column 2	Column 3 as per cent of column 1
	1	2	3	4
	dollars per case			per cent
1926-27	4.31	4.63	- .32	- 7.4
1927-28	4.60	4.33	.27	5.9
1928-29	4.13	4.22	- .09	- 2.2
1929-30	4.82	4.73	.09	1.9
1930-31	3.53	3.50	.03	0.8
1931-32	2.82	2.94	- .12	- 4.3
1932-33	2.48	2.35	.13	5.2
1933-34	2.64	2.61	.03	1.1
1934-35	3.05	2.95	.10	3.3
1935-36	2.92	2.98	- .06	- 2.1
1936-37	2.92	2.91	.01	0.3
1937-38	3.07	3.42	- .35	- 11.4
1938-39	2.77	2.77	0	0
1939-40	3.27	3.09	.18	5.5
1947-48	7.07	6.35	.72	10.2
1948-49	7.37	7.20	.17	2.3
1949-50	5.15	5.73	- .58	- 11.3

Sources of data:
- Col. 1: From table 1, col. 1.
- Col. 2: Estimated by equation (4) table 5.
- Col. 3: Col. 1 minus col. 2.
- Col. 4: Col. 3 as per cent of col. 1.

TABLE NUMBER 1

Actual and Estimated Price Movements Modified and Compared with Barlow's Data, 1928-29 to 1949-50

Year, June through May	Actual price movements		Estimated price movements		Difference between column 3 and minimum column 2	Column 4 over column 2 as percent of column 2
	1	2	3	4	5	6
	dollars per cwt.					per cent
1928-29	4.31	4.05	4.65	.60	- .22	- 7.4
1929-30	4.60	4.35	4.55	.20	.27	6.9
1930-31	4.13	4.22	4.22	.00	- .23	- 2.2
1931-32	4.82	4.75	4.75	.00	.20	1.9
1932-33	5.55	5.60	5.60	.00	.70	0.8
1933-34	2.82	2.94	2.[illegible]	.12	- .19	- 4.6
1934-35	2.48	2.35	2.35	.15	.15	5.2
1935-36	2.64	2.81	2.81	.00	.35	1.1
1936-37	2.05	2.95	2.[illegible]	.10	.17	3.3
1937-38	2.22	2.08	2.[illegible]	.08	- .06	- 2.1
1938-39	2.86	2.91	2.[illegible]	.01	.01	0.5
1939-40	3.07	3.42	3.[illegible]	.[illegible]	- .35	- 10.4
1940-41	2.77	2.77	2.[illegible]	[illegible]	[illegible]	[illegible]
1941-42	3.27	3.09	3.[illegible]	.[illegible]	.[illegible]	3.5
1942-43	6.07	6.35	6.[illegible]	.[illegible]	.[illegible]	10.2
1943-44	6.37	7.20	7.[illegible]	.[illegible]	.[illegible]	9.3
1944-45	8.15	8.75	8.[illegible]	[illegible]	- .[illegible]	- 1[illegible].3

Source of data and notes:
Col. 1: From trade journal [illegible].
Col. 2: Estimated by equation (4) table 5.
Col. 3: Col. 1 minus col. 2.
Col. 4: Col. 3 per cent of col. 2.

TABLE 5

Statistical Analyses of Factors Affecting Annual Average F.O.B. Prices of Pacific Coast Bartlett Pears, 1926-27 to 1949-50

Equation number	Multiple regression equations			$\bar{R}$ Adjusted coefficient of multiple correlation
	Dependent variable	Constant term	Independent variables and their net regression coefficients (figures in parentheses are t-ratios and in brackets are beta coefficients)	
1	X_1	-20.289652	$-0.415078X_2$ (2.539092) [-0.295943] $+ 10.932893 \log_{10}X_3$ (9.515656) [1.507596] $+ 0.027202X_4$ (2.390179) [0.427890]	0.960
2	X_1	-20.162491	$-2.494748 \log_{10}X_2$ (2.025566) [-0.233567] $+ 10.722545 \log_{10}X_3$ (8.769446) [1.478590] $+ 0.029257X_4$ (2.412267) [0.460216]	0.954
3	X_1	-33.439052	$-1.980582 \log_{10}X_2$ (1.548810) [-0.185429] $+ 11.441924 \log_{10}X_3$ (8.381692) [1.577789] $+ 7.289207 \log_{10}X_4$ (2.642357) [0.591805]	0.957
4	$\log X_1$	- 3.614155	$-0.236203 \log_{10}X_2$ (2.840918) [-0.225545] $+ 1.224042 \log_{10}X_3$ (13.790884) [1.721510] $+ 0.879113 \log_{10}X_4$ (4.901370) [0.727958]	0.981

X_1 = annual average f.o.b. price of Pacific Coast canned Bartlett pears (in dollars per case);

X_2 = domestic shipments of Pacific Coast canned Bartlett pears (in units of 1,000,000 cases);

X_3 = index of United States nonagricultural income (1935-1939=100);

X_4 = adjusted index of prices of competing canned fruit (1935-1939=100).